

CLAIMS

I claim:

- 1 1. A system for improving signal-to-noise ratio for
2 an eye gaze tracker, comprising:
3 an illuminator for illuminating a user's eye with
4 light radiation;
5 a camera for detecting an illuminator signal from
6 said illuminator light radiation reflected from the
7 user's eye and also detecting ambient light noise, said
8 camera outputting an output signal;
9 means for synchronizing said illuminator to turn
10 on with a first interval of said camera and turn off
11 with a second interval of said camera;
12 means for digitizing said output signal and
13 capturing a first image from said first interval having
14 an illuminator signal portion and an ambient light
15 noise portion and capturing a second image from said
16 second interval having said ambient light noise
17 portion; and
18 means for subtracting said first image from said
19 second image to produce an output image substantially
20 devoid of said ambient light noise portion.
- 1 2. A system for improving signal-to-noise ratio for
2 an eye gaze tracker as recited in claim 1 wherein said
3 first and second intervals comprise camera frames.

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1 3. A system for improving signal-to-noise ratio for
2 an eye gaze tracker as recited in claim 2 wherein said
3 means for subtracting subtracts according to the
4 expression $o_n = |f_n - f_{n-1}|$, where n is an integer ≥ 0 , o
5 is said output image, and f are said camera frames.

1 4. A system for improving signal-to-noise ratio for
2 an eye gaze tracker as recited in claim 2 wherein said
3 means for subtracting subtracts according to the
4 expression $o_n = |f_n - (f_{n-1} + f_{n+1})/2|$, where n is an
5 integer ≥ 0 , o is said output image, and f are said
6 camera frames.

1 5. A system for improving signal-to-noise ratio for
2 an eye gaze tracker as recited in claim 1 wherein said
3 first and second intervals comprise a first raster
4 field and a second raster field, respectively, forming
5 a horizontal stripe pattern.

1 6. A system for improving signal-to-noise ratio for
2 an eye gaze tracker as recited in claim 1 wherein said
3 first and second intervals comprise odd and even pixels
4 forming one of a vertical stripe pattern and a
5 checkerboard pattern.

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1 7. A method for improving the performance of an eye
2 gaze tracker system, comprising the steps of:
3 shining a modulated light on a user's eye during a
4 first interval;
5 detecting said modulated light reflected from the

6 user's eye and simultaneously detecting noise light
7 from an ambient source during said first interval and
8 producing a first data comprising a reflection portion
9 and a noise portion;
10 turning off said modulated light during a second
11 interval;
12 detecting said noise light from said ambient
13 source during said second interval and producing a
14 second data comprising said noise portion; and
15 subtracting said second data from said first data
16 to produce an output data comprising said reflection
17 portion.

1 8. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 7 wherein said
3 first interval and said second interval are camera
4 frames.

1 9. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 8 wherein said
3 subtracting step subtracts according to the expression
4 $o_n = |f_n - f_{n-1}|$, where n is an integer ≥ 0 , o is said
5 output data image, and f are said camera frames.

1 10. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 8 wherein said
3 subtracting step subtracts according to the expression
4 $o_n = |f_n - (f_{n-1} + f_{n+1})/2|$, where n is an integer ≥ 0 , o
5 is said output data, and f are said camera frames.

1 11. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 7 wherein said
3 first interval and said second interval are odd and
4 even pixels, respectively.

1 12. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 7 wherein said
3 first interval and said second interval are first and
4 second raster fields, respectively, forming a
5 horizontal stripe pattern.

1 13. A method for improving the performance of an eye
2 gaze tracker system as recited in claim 7 wherein said
3 first interval and said second interval are alternating
4 pixels forming one of a vertical stripe pattern and a
5 checkerboard pattern.

1 14. A computer readable medium comprising software
2 instructions for controlling an eye gaze tracker system
3 to execute the steps of:
4 turning on an illuminator to shine at a user's eye
5 during a first interval;
6 detecting said modulated light reflected from the
7 user's eye and simultaneously detecting noise light
8 from an ambient source during said first interval and
9 producing a first data comprising a reflection portion
10 and a noise portion;
11 turning off said modulated light during a second
12 interval;
13 detecting said noise light from said ambient

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14 source during said second interval and producing a
15 second data comprising only said noise portion; and
16 subtracting said second data from said first data
17 to produce an output data comprising said reflection
18 portion.

1 15. A computer readable medium comprising software as
2 recited in claim 14 wherein said first interval and
3 said second interval are camera frames.

1 16. A computer readable medium comprising software as
2 recited in claim 15 wherein said subtracting step
3 subtracts according to the expression $o_n = |f_n - f_{n-1}|$,
4 where n is an integer ≥ 0 , o is said output data, and f
5 are said camera frames.

1 17. A computer readable medium comprising software as
2 recited in claim 15 wherein said subtracting step
3 subtracts according to the expression $o_n = |f_n - (f_{n-1} +$
4 $f_{n+1})/2|$, where n is an integer ≥ 0 , o is said output
5 data, and f are said camera frames.

1 18. A computer readable medium comprising software as
2 recited in claim 14 wherein said first interval and
3 said second interval are odd and even pixels,
4 respectively.

1 19. A computer readable medium comprising software as
2 recited in claim 14 wherein said first interval and
3 said second interval are first and second raster

